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LATTIMER-STEVENS
METER CONNECTIONS

Congress
APR 16 1923
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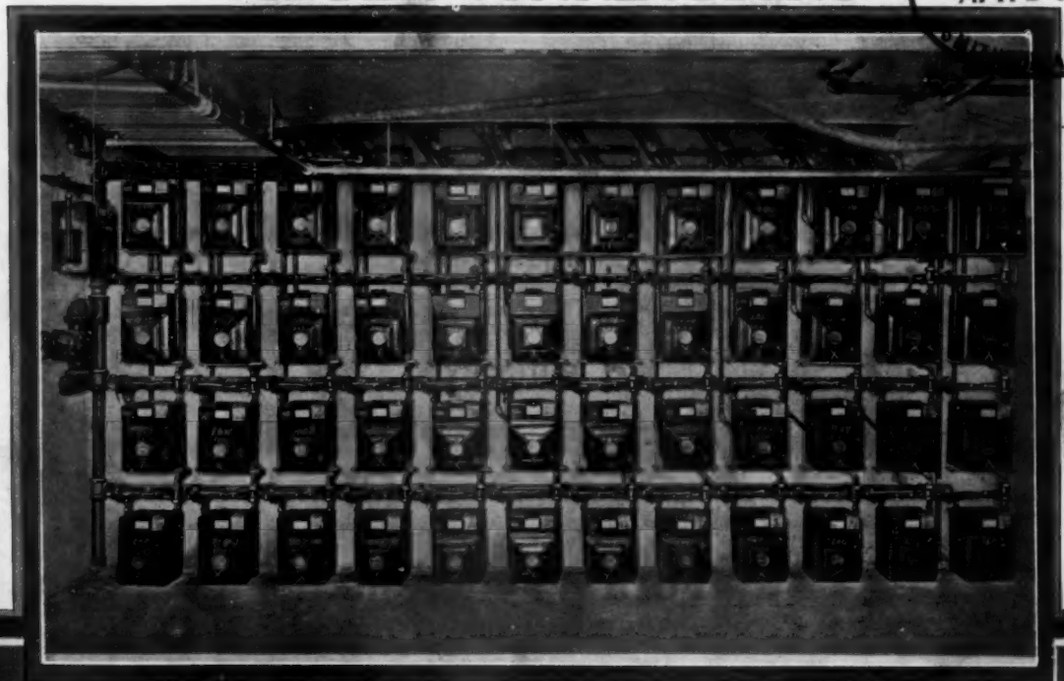

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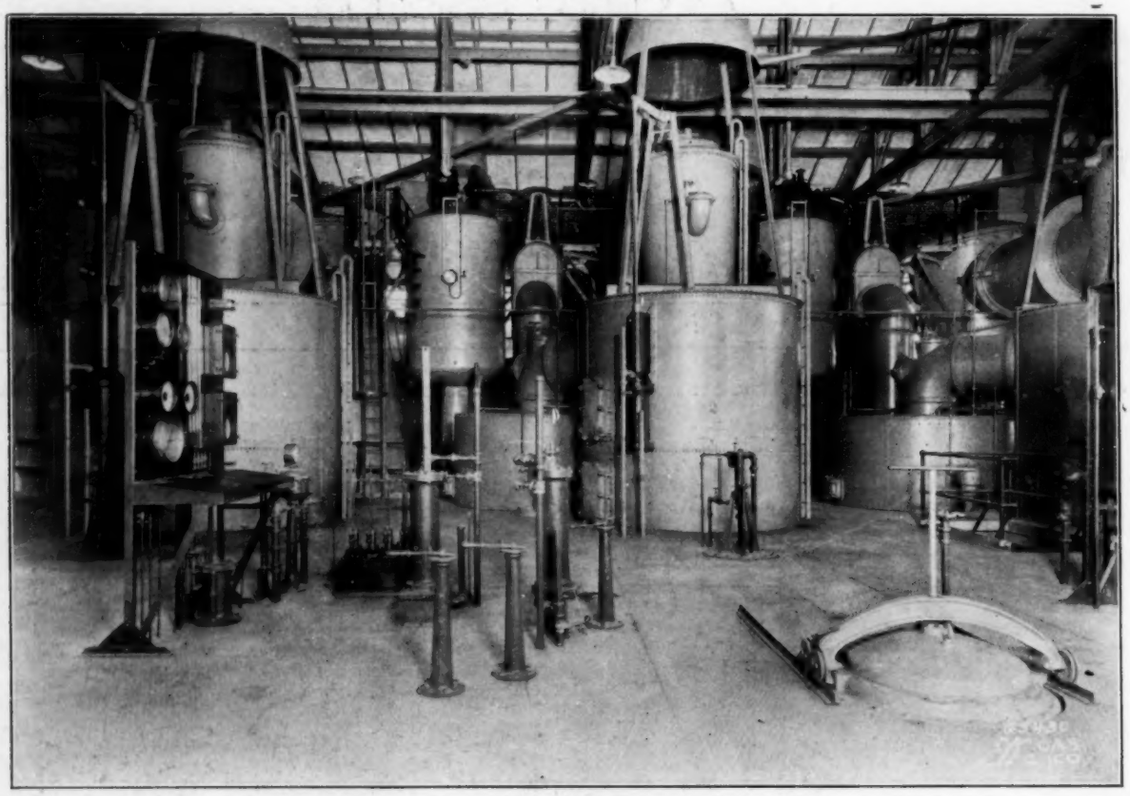

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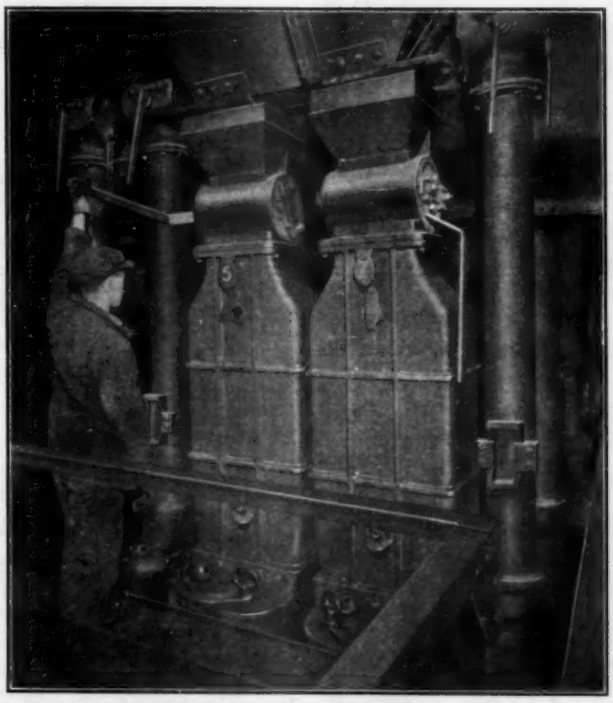

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WEST GAS IMPROVEMENT CO.
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American Gas Journal

SIXTY-THIRD YEAR

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One Way to Solve the House Heating Problem

A SUGGESTED COMBINATION THAT MIGHT WORK OUT

By J. E. Bullard

The greatest obstacle in the way ot doing house heating by gas in a big way is the peak demand. Manufacturing capacity, street main, service pipe, meters and the burners in the house heating plant must all be designed to take care of the heating requirements for the one coldest day in winter. There is only one coldest day any winter. This means that the peak is used, that the maximum demand is reached but once during the winter. This maximum demand may be used but a very few hours.

It may happen that the coldest day in winter is also a windy day, which makes the demand even greater. The wind may cease and the heating requirements drop. It is not good business to invest all the capital needed to supply a demand that lasts but a few hours. If there was diversity to the load that would be an entirely different matter, but when the cold day comes everyone is making extra demands on the company. There appears to be no other loads in sight that can be developed to make use of the extra capacity provided to meet this very temporary house heating peak.

If burners could be installed that would be burned steadily twenty-four hours a day for the full heating season of say six months, this would be business very desirable for the gas company. The load factor would be higher than that of most of the business secured and, though there was practically no diversity to it, the business would prove profitable. But if house heating could be done on this basis, it would prove feasible in many locations to develop summer loads that would use the capacity released when the house heating period was over.

These loads might be hot water heating, refrigerating or some other summer load. With a high load factor on the house heating, however, the importance of such summer loads would not be so great as it is if the load factor of house heating is very low.

Now it is perfectly feasible and to the advantage of everyone concerned for the gas industry to develop a house heating load that is uniform throughout the winter, or at least very nearly uniform. It is merely a matter of letting some other form of fuel take care of the peaks and installing gas burner capacity only sufficient to take care of the steady load.

Oil is a fuel that can be made to burn very satisfactorily in connection with gas in the same fire pot. As a matter of fact, from the consumer's point of view there is a very great advantage in having a reliable gas burner always burning when he is burning oil. As a matter of fact, there are a number of oil burners that do use a gas pilot light now for the purpose of igniting the oil in case the flame is extinguished for any cause.

Some of the oil burners smoke when the oil alone is relied upon to provide the heat. Others have disadvantages that could be eliminated if a gas burner was steadily burning. A goodly number of the oil burners designed for house heating can readily be adapted to combination gas and oil heating.

This means that the gas man can install in the house heating plant a gas burner that will by itself take care of all the heating requirements on the warmer days. The burner may be of such size that it will be needed from the time heat is first required in the fall till spring, when it is no longer needed. It may be a little larger, or two burners may be used. In any case, it is possible to place in the fire pot a burner that will prove a very desirable load.

Then, if in connection with the gas burner there is used an oil burner, the most efficient operation of which depends upon some heat being derived from the gas burner, it becomes necessary for the consumer to use the gas all the time. The oil is used only when additional heat is needed. By using the gas heat as a sort of auxiliary to the oil burner, a problem in oil burner design is solved. It becomes possible to make an oil burner that requires no electric motor to maintain an air pressure for the purpose of atomizing the oil, no pressure on the oil supply, and no unstable and more or less unsatisfactory method of vaporizing the oil, if no pressure on the oil or air is used. The gas burner can be made to do all that must be done to make the oil burn efficiently and without smoke.

When gas is used in this way the cost of heating with the present prices of oil can also be made lower than it would be if gas alone was used. It is also much cheaper for the gas company to handle gas house heating in this manner. If the gas company produces benzol this may be adapted to take care

of the liquid fuel part of the equipment, thus supplying a sure market at good prices among the gas company consumers for this by-product.

Eliminating Unprofitable Peak Loads

So this form of house heating may be made of advantage to the gas company in a way other than to eliminate the unprofitable peak loads. It might be worth while to carry on some research work to determine if some of the other by-products could not be changed into a form such that they would serve as satisfactory liquid fuel or to determine if some design of combination gas and liquid fuel could not be found which would make it possible to use some of the cheaper gas plant by-products in a satisfactory manner. For example, should a burner be designed that with a steady consumption of gas throughout the heating season would make it possible to use water gas tar, or a distillate from it for the liquid fuel, very decided advantages would result both for the consumer and the gas company.

The promise of making straight gas house heating a truly profitable load for the gas company, when this load passes beyond a certain point, are not as hopeful according to some authorities as we might wish. In some locations, such house heating will work out very satisfactory. In others it will not. It depends very largely upon the success experienced in finding consumption that will make use of the capacity released during the warm months of the year, and it depends upon whether the winter temperature is uniform or fluctuates over a wide temperature range.

Combination liquid and gas fuel, however, is perfectly feasible. The gas takes care of the steady load just as in the gas plant the coal gas plant takes care of the steady load and the liquid fuel takes care of the fluctuations in load just as at the gas plant the water gas sets take care of the fluctuations in the load. As a matter of fact, it is merely a matter of applying the same principles to house heating that have been applied to the manufacture of gas.

All that is necessary to make this form of house heating successful is to find combination burner equipment that will give the type of service desired. If ordinary furnace oil is used as the auxiliary and the gas company does not develop a by-product that will serve the purpose of a liquid fuel, the gas company will find that it has greatly increased the sale of gas for house heating, because there will be so many people interested in selling oil burners and oil who will push the combination burner because of its inherent advantages.

Such a burner, giving absolutely reliable service, could be built to sell at a lower price than straight oil burners that do not give perfect satisfaction. It would sell at a price considerably below the price of oil burning outfits that have all the auxiliaries needed to make the oil burner entirely satisfactory. A reliable source of heat such as the gas burner provides opens the way to the design of oil burners that will burn cheaper grades of liquid fuel than those burned by the installations now being made.

Combination Offers Opportunities

The combination of oil and gas then offers wonderful opportunities for increasing the gas load and doing so in a profitable manner, and in solving in a satisfactory way the house heating problem which in the present state of the fuel situation and the state it promises to remain in for years to come has not yet been solved satisfactorily. There is reason to believe that the combination burner will make it possible to bring the cost of combination oil and gas heating down to a point where, all things being considered, it will be no greater than heating with coal. The extra demand made on the gas plant, and a possible outlet being provided for the water gas by-products, indicates that it may be possible to strike such a balance between water gas and coal gas sets that all the coke not needed for metallurgical purposes can be burned under the boilers or used in the water gas sets. All the troubles connected with the sale and the distribution of coke are then solved. The gas company will be doing a much needed conservation job and every home in town will be a better one in which to live when the coal bin and the ashcan are entirely eliminated from the household.

Assume Something

In selling household appliances it is good psychology to assume something. To illustrate: When a prospect says, "I want to look at a gas water heater," assume that he wants Hot Water Service and show him one of the larger size heaters, saying, "This heater will furnish all the hot water you need for two bathrooms, a kitchen and two laundry

Assume Something

trays." If he lives in a small house with but one bathroom and no laundry he will be quick in saying, "Why, I have no use for such a large heater; I have but one bathroom in my home and the only other hot water spigot I have is in the kitchen." Let him tell you what he has and then you can recommend exactly the proper size heater. It is much better to work down than to work up on price in selling household appliances.

The "Why of the Gas Meter"*

THE INVENTION OF THE METER SAVED THE GAS INDUSTRY

By Wadsworth C. Sykes

For the first twenty years of its use, gas was sold without being metered. It is no wonder that numerous eminent and respectable persons, including in their number such august names as Sir Walter Scott and Napoleon, should have ridiculed the incipient industry as a grand folly. The wonder is that it survived at all. The custom current in England at the end of the 18th century of selling gas with a charge based on the number and size of the burners to be supplied nearly brought about its untimely end. The inspectors, who went nightly from house to house to see that only the specified number of burners were in use and who were authorized to cut off the gas in the street if a consumer failed to extinguish the lights at the proper time, were unable adequately to protect the company's interests, although the little they were able to do rendered them extremely disliked by the consuming public, the unscrupulous in particular. The poverty stricken companies and the disgruntled consumers did not pull together well even though the utility of the freak fuel had by this time been well demonstrated.

The invention of a reliable meter by Samuel Clegg in 1815 saved the situation. This meter, which is known as the "wet type," consisted of a revolving measure wheel sealed by water. This type of meter with some mechanical improvements is in use at the present day as a test meter for which its extreme accuracy has rendered it especially suitable. It has been rendered of little importance as a house meter in this country by a more simple meter which was invented some thirty years later. This meter, which is known as the two-diaphragm, double slide valve dry meter, is familiar to all users of gas, and bears the brunt of the gas measurement of today. The widely acknowledged accuracy of this meter is remarkable. Its quality of endurance is amazing. These characteristics are readily demonstrated by the routine of the average meter. It is adjusted to not less than 98 per cent accuracy and set in a cellar, often under very unfavorable and trying conditions such as dampness, extreme temperature variation, etc.; then, after seven years of continuous operation without care or adjustment, it is taken out for testing and repairs. Over 90 per cent of the meters on this test are either within 3 per cent of being perfectly accurate or are slow; that is, they do not register quite all of the gas passed, which gives the consumer the benefit of the difference.

This brings up the point, which is probably of greatest interest to the man who pays the bills, that of the meters which do not maintain perfect accuracy, the great majority err in favor of the consumer. The reasons for this are that only one of the several chief ways in which a meter eventually

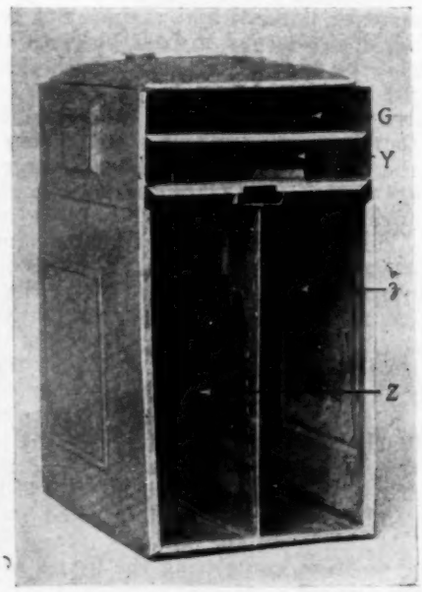


Fig. 1.—Consumers Meter, Side View—Outlet Side and Working Parts Removed. G, Gallery; Y, Valve Chamber; Z, Compartments.

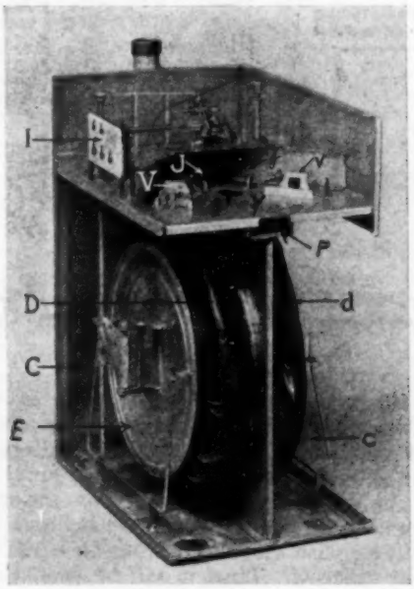


Fig. 2.—Same Meter, Front and Side View. Valves Cut Away. C.c, Diaphragm Chamber; D.d, Diaphragms; I, Index; J.j, Valve Arms; V.v, Valves.

*Reprinted from the Gas and Electric News. Published by the Rochester (N. Y.) Gas & Electric Corporation.

wears out, causes it to over register; all the rest tend to make the meter register slow. The following description of the operation of the meter will render this more evident.

The meter is mechanically a two-cylinder, double-action motor, and if connected up would deliver power along the shaft that actuates the recording dial, but used as a measuring device it is allowed to run free, developing only enough power to overcome its own friction. Reference to Figures 1 and 2 will show the interior construction of the meter. The actual measuring chambers are the inside of the flexible bellows D and the surrounding space

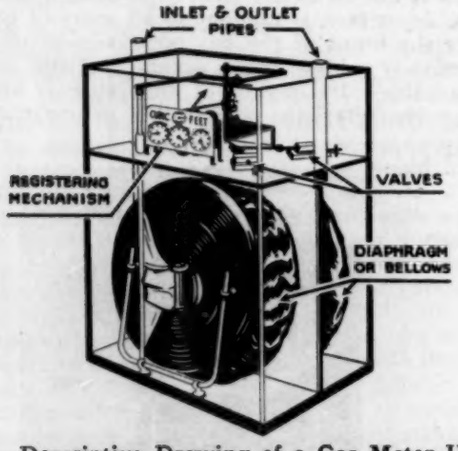


Fig. 3.—Descriptive Drawing of a Gas Meter Used in Advertisement of Recent Prize Essay Contest

C which is contained within the walls of Z when the meter is assembled. When gas is allowed to flow into the space C, the bellows D collapse, forcing out their contents and allowing an equal amount to enter the space C. Now, when by action of the valves, gas is allowed to enter the bellows D, they expand, filling with gas and driving an equal amount out of the space C. Thus it can be seen that each time the bellows D collapse, they force out of the meter an amount of gas equal to the capacity of the bellows D, and each time they open they force out of the meter from the space C an amount of gas equal to the capacity of the bellows D, so that one complete stroke forward and backward of the bellows D delivers from the meter a definite amount of gas always equal to twice the capacity of the bellows D. The parts lettered small d and z are exactly similar in size and action, so that each complete stroke of D means a complete stroke of d also, and an amount of gas equal to four times the capacity of the bellows D is delivered from the meter.

The valves on the two sides of the meters are set in such a way that D is a quarter of a complete stroke behind d. This results in D being half through its travel one way when d has completed its travel one way and is about to reverse its direction, and again, d, is half through its travel when D is at the end of its travel. This arrangement is made because the motion of the meter depends upon the pressure of the incoming gas, which is always a little above that of the outgoing gas, against the tin disk E, except when the disk is at the end of its travel in one direction. At this point the motion of the other disk, e, is necessary to move the valve controlling the inlet pressure against E, so that the inlet pressure will be reversed on E and cause it to travel in the other direction. This explains the necessity for the two-diaphragm or two-bellows meter. Aside from this, each bellows with its valves and mechanism is a complete unit.

The valves V and v along with their actuating arms J and j are enclosed in the gas tight chamber V into which the inlet gas flows through the aperture O which is connected to the passage P coming from the inlet connection of the meter. The valve seat, over which the valve slides, has three parallel slots, the first of which connects with the inside of the bellows D, the middle one to a passage leading to the outlet of the meter, and the third to space C. The valve itself is a rectangular block just wide enough to cover two slots at a time and hollowed out so that it allows gas to pass between the two slots it connects, while at the same time it shuts them off from the inlet gas in the valve chamber Y.

The valve Y functions in the following manner: Suppose that it covers the two slots leading to the inside of the bellows D and the outlet passage. Then the passage to the space C will be open to chamber Y, and the inlet gas will pass through it into the space C. This will cause the disk E to move, expelling the gas from the bellows D out through its passage into the passage to the outlet of the meter. When E has reached the end of its travel, the valve mechanism actuated by the motion of the disk E, which at this time is in the middle of its travel as previously explained, moves the valve over to cover the slots to the space C, and the outlet passage, leaving the slot leading to the inside of the bellows open to the inlet gas. This causes the disk E to move in the opposite direction until the bellows D are filled and the gas has been expelled from the space C. At this point the valve is moved back to its original position, completing the first stroke and starting the second.

The motion of the disk E is transferred by a suitable mechanism to the index (see Figure four for enlarged view), where it is recorded by the dials. These dials are so arranged that a complete revolution of the dial on the right causes the middle dial to move one unit, as from five to six, and a complete revolution of the middle dial causes the dial on the left to move one unit and the one on the right ten revolutions. Thus it is evident that if one unit on the right hand dial indicates the passage of 100 cubic feet of gas, a complete revolution indicates the passage of 1,000 cu. ft.; a complete revolution of the middle dial, 10,000 cu. ft., and a complete revolution of the left hand dial, 100,000 cu. ft.; or the units on the first dial should be read as hundreds, those of the second as thousands, and those of the third as ten thousands. The reading taken from each dial is that of the last figure passed by the hand, which always revolves in the direction of the ascending figures. The dials are read from right to left and the figures put down accordingly. In cut three the

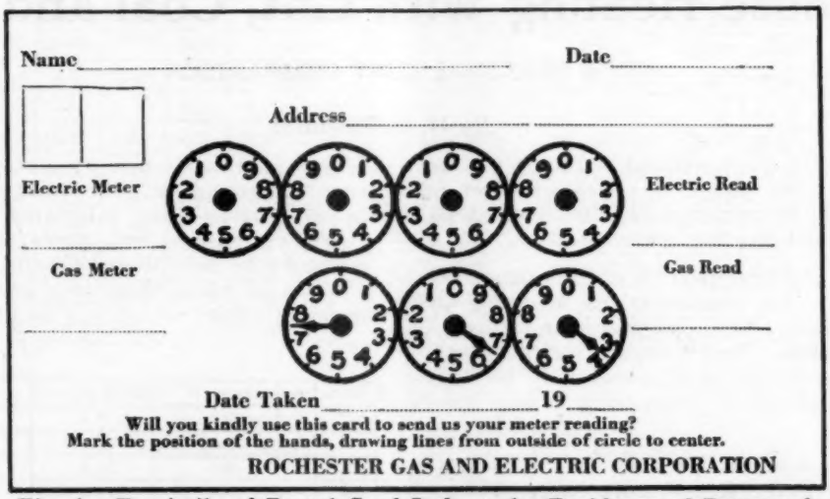

Name
Date
Address
Electric Meter
Electric Read
Gas Meter
Gas Read
Date Taken 19
Will you kindly use this card to send us your meter reading?
Mark the position of the hands, drawing lines from outside of circle to center.
ROCHESTER GAS AND ELECTRIC CORPORATION

Fig. 4.—Facsimile of Postal Card Left at the Residence of Patrons for Them to Use After Meter Reader's Call and Follow-up Fail to Obtain Access to the Meter. Gas Meter Reading, as Taken by a Customer Shows 76,300 Cu. Ft. of Gas Used in This Instance.

reading of the first dial is 300, the next is 6,000, and the third 70,000, making a total of 76,300 cu. ft., or, if the figures are written down from right to left as they read, you have 300, then 6,300, and finally 76,300. This reading must be subtracted from any subsequent reading to give the number of cu. ft. of gas used in the intervening period.

It is evident from the foregoing description that the index registers the motion of the bellows disks E and that these cannot move without discharging gas from the meter. The most common causes rendering a meter inaccurate are cracking of the leather bellows, allowing gas to pass from the inlet to the outlet chamber without motion of the disk and registration; wearing and leakage of the valves so that gas can pass directly from the valve chamber under the valve to the outlet passage without passing through the measuring chambers; wearing of the connecting mechanism, causing tardy action of the valves and allowing a longer stroke of the disk E and more gas to pass than the meter is adjusted for; and the breaking or sticking of some part so that the meter fails to register or fails to pass gas.

The usual interval between readings by the company for the purpose of billing is thirty days. It must be remembered that this period is sometimes lengthened by the occurrence of holidays and unusual events, so that the amount on these bills may appear to be unusually large and cast undue suspicion on the gas meter until it is noted from the dates on the bill that it is for more than thirty, instead of the usual thirty day period.

Rochester is divided into sections which are read one at a time, the meter readers covering the whole city in thirty days. Each reader has his own route in each section, and reads it every month. In case no one is at home on the regular reading, at least one more call is made. If this is unsuccessful, a card is left, having a meter index on it, on which the consumer is requested to indicate the position of the hands of the meter at the time and mail to the company.

Each month comparers go through the books and the bills of each consumer are compared with those of previous months. In this way mistakes in reading and serious inaccuracies of the meters can be detected before the bill is sent out, and the meter can be re-read. This checking of the original readings is almost an excess of caution, as the report of December, 1922, shows that only one mistake was made to every 1,500 read.

Maintain Repair Shop

A large repair shop is maintained by the company for overhauling the meters. This is done periodically, a record being kept of every meter so that after it has been seven years in use it comes up for overhauling. By this arrangement the meters which were last overhauled in 1916 will go through the shop this year. In addition to these periodic repairs, such meters as require minor adjustments during the course of the seven-year period are repaired in the shop.

Meters are tested and adjusted by the company. Then, before being put in service, they are tested by the state inspector, a representative of the Public Service Commission, who stamps each meter with the state seal if it comes within the limit required by the law. A record of each meter thus stamped is made and filed at Albany for reference.

The company has 85,000 meters in service. The investment and maintenance expense which these represent is large in itself, but small in comparison with the indispensable service they render. The growth of the company is such that from two to seven thousand new meters are installed yearly.

House Heating with Gas, Coal and Oil*

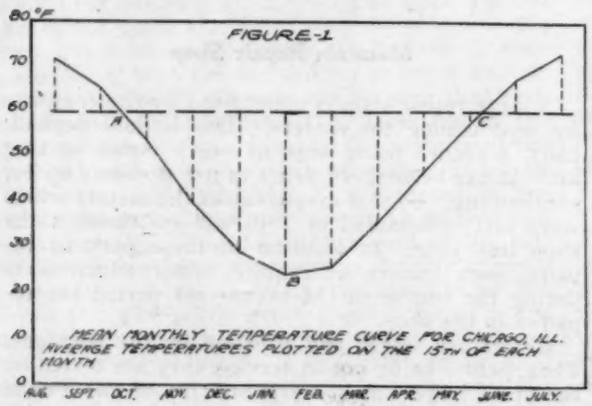
A SEASONAL COST COMPARISON

By H. D. Valentine

This investigation is prompted by the ever-increasing interest of the public in operations and fuels which will help to minimize the inconveniences of our present house heating methods.

The data in the first portion of this paper relate only to hypothetical considerations involving present day fuel costs efficiencies and heat ratios. The latter part amplifies these comparative costs by secondary charges which must necessarily be considered when intelligently comparing house heating costs.

All heat requirements for a season in Chicago are based on an average temperature base, 60 deg. F., at and below which it is assumed that artificial heat is necessary for comfort. Figure 1 represents the monthly mean temperature curve of Chicago taken from a report of the U. S. Weather Bureau covering a period of fifty years. In this curve the months are plotted as abscissae and temperatures as ordinates, the average temperature ordinate being shown as a dotted line on the fifteenth of each month. It will be observed that the heating season for Chicago begins on the first of October and terminates on about the 24th of May, representing practically an eight month period. It is obvious that the quantity of artificial heat to be supplied is directly proportional to the temperature and can be expressed by the area A- B- C in Figure 1. This area may be expressed in B. T. U's., tons of coal, cubic feet of gas, gallons of oil, kilowatt-hours of electricity, dollars or any other desired unit.



In order to accurately determine the monthly fuel charges throughout a heating season, it is necessary to establish the percentage of heat required for each month. This distribution is shown graphically by Figure 2. It is assumed, which is correct, that the average temperature persists for the number of days in the month. By using a unit, termed for convenience, "degree-days," the monthly fuel requirement in per cent is easily calculated. (See Table—1.)

We will assume now three homes requiring five, ten and fifty tons of coal for the heating season. By a series of calculations, it is possible to construct a series of tables which will be explained as follows:

MONTH	DAYS	AV. TEMP. °F	DEGREES BELOW 60	DEGREE-DAYS	% FUEL DISTRIBUTION
OCT.	31	53.7	6.3	195.3	3.8
NOV.	30	39.8	20.2	606.0	12.0
DEC.	31	29.1	30.9	957.9	19.0
JAN.	31	24.4	35.6	1103.6	21.9
FEB.	28	26.0	34.0	952.0	18.9
MAR.	31	35.8	24.2	750.0	14.9
APR.	30	46.8	13.2	396.0	7.8
MAY	30	57.2	2.8	86.8	1.7
TOTAL				5047.8	100.0

TABLE-1
COMPUTATIONS FOR DETERMINING MONTHLY HEAT DISTRIBUTION

Comparative Costs of Burning Coal

Table 2

In this table the first column shows the months comprising the heating season. In the second column the fuel distribution in per cent is tabulated, while the third, fourth and fifth columns show the actual tons of coal used in monthly increments for each of the arbitrary cases of five, ten and fifty tons of coal per heating season respectively.

Assuming now a coal of 14,000 B. T. U. per pound and burned with a 40 per cent overall efficiency, we arrive at the data in the sixth, seventh and eighth columns which represent the actual B. T. U's consumed. At $15.60 per ton, plus sixty cents per ton for carrying to bin, the monthly and total coal costs are tabulated in the last three columns.

Comparative Costs of Burning Gas

Table 3

In Table 1, columns six, seven and eight represent the actual B. T. U.'s consumed, necessary to maintain the heat losses throughout the heating season. Consequently, this number of B. T. U.'s must be supplied regardless of the type of fuel used. In other words, these values are the 100 per cent efficiency values. In the case of gas, which we shall assume to have an overall efficiency of 80 per cent in order to supply the correct number of B. T. U.'s, it is necessary to buy 20 per cent more B. T. U.'s than actually required on the 100 per cent basis. These are the figures tabulated in columns six, seven and eight, and are the basis for columns three, four and five, representing the cubic feet of gas used and the last three columns which give the cost data. This cost data is computed according to our present gas rates, as follows:

*Presented before Illinois Gas Association Convention.

MONTH	% FUEL	COAL USED (TONS)			B.T.U CONSUMED			COST (DOLLARS)		
		5-TON	10-TON	50-TON	5-TON	10-TON	50-TON	5-TON	10-TON	50-TON
OCT.	3.8	0.19	0.38	1.9	2,128,000	4,256,000	21,280,000	3.08	6.16	30.80
NOV.	12.0	0.60	1.20	6.0	6,720,000	13,440,000	67,200,000	9.72	19.44	97.20
DEC.	19.0	0.95	1.90	9.5	10,640,000	21,280,000	106,400,000	15.39	30.78	153.90
JAN.	21.9	1.095	2.19	10.95	12,264,000	24,528,000	122,640,000	17.74	35.48	177.40
FEB.	18.9	0.945	1.89	9.45	10,584,000	21,168,000	105,840,000	15.30	30.60	153.00
MAR.	14.9	0.745	1.49	7.45	8,344,000	16,688,000	83,440,000	12.07	24.14	120.70
APR.	7.8	0.39	0.78	3.90	4,368,000	8,736,000	43,680,000	6.32	12.64	63.20
MAY	1.7	0.085	0.17	0.85	952,000	1,904,000	9,520,000	1.38	2.76	13.80
TOTAL	100.0	5.000	10.00	50.00	56,000,000	112,000,000	560,000,000	81.00	162.00	810.00

TABLE-2

COMPARATIVE COSTS OF BURNING COAL
14000 B.T.U. PER POUND @ $15.60 + 0.60 PER TON
EFFICIENCY = 40%

5 tons of coal residence assume a 45 light meter with a net charge of $1.20 for the first 400 cubic feet of gas.

10 tons of coal residence, assume a 60 light meter with a net charge of $1.50 for the first 400 cubic feet of gas.

50 tons of coal residence, assume a 100-B light meter with a net charge of $1.75 for the first 400 cubic feet of gas.

The primary rate is one dollar ($1.00) net for each 1,000 cubic feet of gas used in any one month in excess of the first 400 cubic feet used in said month and within a total consumption of not more than 10,000 cubic feet.

The secondary rate is ninety-five cents (95c) net for each 1,000 cubic feet of gas used in any one month in excess of 10,000 cubic feet used in said month and within a total consumption of not more than 50,000 cubic feet.

The tertiary rate is ninety cents (90c) net for each 1,000 cubic feet of gas used in any one month in excess of the first 50,000 cubic feet used in said month.

Comparative Costs of Burning Oil

Table 4

Here again the basis of comparison is the B. T. U.'s bought. Assuming a 60 per cent efficiency, the actual number of B. T. U.'s required are given in columns six, seven and eight. Assuming now 127,400 B. T. U. per gallon and selling at eleven and one-half cents a gallon, the cost columns are easily calculated.

In the foregoing we have considered bare fuel costs. Such an analysis, though mathematically correct, is unfair when formulating comparative costs, inasmuch as there are charges against fuels which admit a monetary value equivalent, and therefore must be considered. These are essentially as follows:

1. Labor and auxiliary charges in fuel utilization.
2. Cleanliness in fuel utilization.
3. Storage space for fuel and refuse.
4. General satisfaction in operation.

MONTH	%FUEL	GAS USED (CU.FT.)			B.T.U. BOUGHT			COST (DOLLARS)		
		5-TON	10-TON	50-TON	5-TON	10-TON	50-TON	5-TON	10-TON	50-TON
OCT.	3.8	4,972	9,944	49,720	2,660,000	5,320,000	26,600,000	5.77	11.04	49.08
NOV.	12.0	15,701	31,402	157,010	8,400,000	16,800,000	84,000,000	16.22	31.43	145.66
DEC.	19.0	24,860	49,720	248,600	13,300,000	26,600,000	133,000,000	24.92	48.83	228.09
JAN.	21.9	28,654	57,308	286,540	15,330,000	30,660,000	153,300,000	28.52	56.04	262.24
FEB.	18.9	24,729	49,458	247,290	13,230,000	26,460,000	132,300,000	24.79	48.59	226.91
MAR.	14.9	19,495	38,990	194,950	10,430,000	20,860,000	104,300,000	19.82	38.64	179.81
APR.	7.8	10,206	20,412	102,060	5,460,000	10,920,000	54,600,000	11.00	20.99	96.20
MAY	1.7	2,224	4,448	22,240	1,190,000	2,380,000	11,900,000	3.02	5.55	21.98
TOTAL	100.0	130,841	261,682	1,308,410	70,000,000	140,000,000	700,000,000	134.06	261.11	1209.97

TABLE-3

COMPARATIVE COSTS OF BURNING GAS
535 B.T.U. PER CUBIC FOOT @ PRESENT RATE
EFFICIENCY = 80%

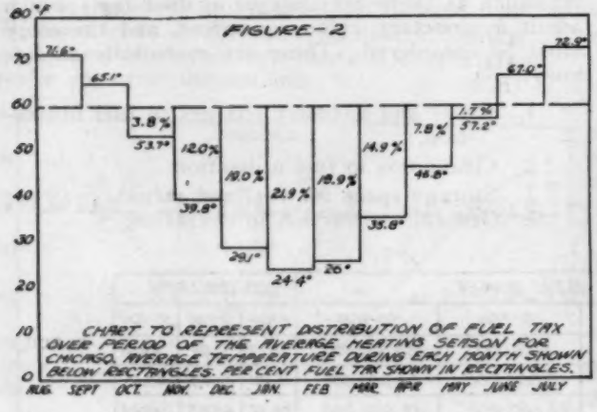
MONTH	% FUEL	OIL USED(GALLONS)			B.T.U BOUGHT			COST(DOLLARS)		
		5-TON	10-TON	50-TON	5-TON	10-TON	50-TON	5-TON	10-TON	50-TON
OCT.	3.8	36	72	360	4,586,400	9,172,800	45,864,000	4.14	8.28	41.40
NOV.	12.0	114	228	1140	14,523,600	29,047,200	145,236,000	13.11	26.22	131.11
DEC.	19.0	180	360	1800	22,932,000	45,864,000	229,320,000	20.70	41.40	207.00
JAN.	21.9	208	416	2080	26,499,200	52,998,400	264,992,000	23.92	47.84	239.20
FEB.	18.9	179	358	1790	22,804,600	45,609,200	228,046,000	20.59	41.18	205.90
MAR.	14.9	141	282	1410	17,963,400	35,926,800	179,634,000	16.21	32.42	162.10
APR.	7.8	74	148	740	9,427,600	18,855,200	94,276,000	8.51	17.02	85.10
MAY	1.7	16	32	160	2,038,400	4,076,800	20,384,000	1.84	3.68	18.40
TOTAL	100.0	948	1896	9480	120,775,200	241,550,400	1,207,752,000	109.02	218.04	1090.20

TABLE-4
COMPARATIVE COSTS OF BURNING OIL
127,400 B.T.U PER GALLON @ 11½ CENTS PER GAL.
EFFICIENCY = 60 %

1—Labor and Auxiliary Charges in Fuel Utilization.

For small residences using from five to fifteen tons of coal per season, it has been found that a fair charge for service to feed the fuel and remove refuse from the basement is ten dollars per month. The difficulty of arriving at such a value is apparent when the divers types of such service available are considered, but certainly, as an average, this figure is not too high. The service charge for the season will therefore be eighty dollars ($80.00).

Figuring now two tons of hard coal for 100 square feet of steam radiation, fifty tons of coal should take care of 2,500 square feet. The average four-room apartment contains 200 square feet of steam radiation, and therefore our fifty tons of hard coal will heat twelve such apartments. From a study of the union wages for janitors, it is assumed that a service tax of two dollars per month per apartment is fair, making the cost for such service for a season one hundred and ninety-two dollars ($192). There is no doubt this tax will be disputed, inasmuch as janitors will be busy with other duties even if relieved of boiler duties. With this argument in mind, a season labor charge of Eighty Dollars ($80) will be made a constant for all three examples.



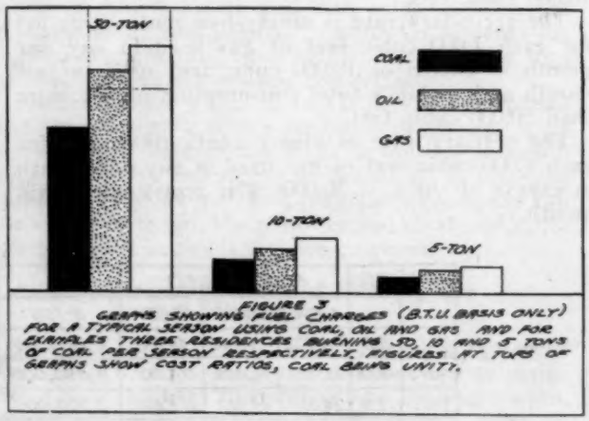


FIGURE 3
GRAPHS SHOWING FUEL CHARGES (B.T.U. BASIS ONLY) FOR A TYPICAL SEASON USING COAL, OIL AND GAS AND FOR EXAMPLES THREE RESIDENCES BURNING 50, 10 AND 5 TONS OF COAL PER SEASON RESPECTIVELY. FIGURES AT TOPS OF GRAPHS SHOW COST RATIOS, COAL BEING UNITY.

The above are service figures on coal fired equipment. For oil fuel there is no such charge, but another, equally important, is generally overlooked. In most of the domestic oil burning units, a gas pilot is necessary to initiate combustion, and a motor blower to distribute the fuel. A study of gas and electric charges on such installations show an average of thirty-five dollars ($35.00) for the heating season.

2—Cleanliness in Fuel Utilization
3—Storage Space for Fuel and Refuse

Because of the interpendability of these two factors, they will be considered together. The fact that coal is a decidedly dirty fuel, oil almost as bad and gas just the reverse, is readily conceded, but to ascribe a definite value to gas for its superiority in this respect is exceedingly difficult. However, this feature of coal and oil fuel, together with the storage space required for the coal pile, ash heap or oil tank and the noise and odor accompanying the utilization of oil fuel, makes the problem somewhat simpler. With gas fuel, the basement, especially of the English type, becomes tenable; it automatically resolved itself into a playroom, a dance hall, a billiard room, a gymnasium, or may even be rented for living quarters. In other words, another room is added and

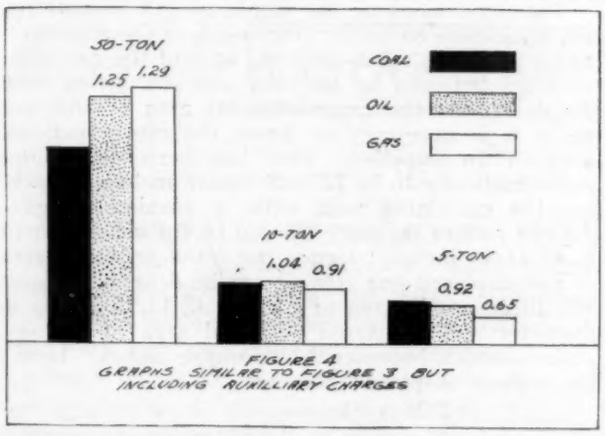


FIGURE 4
GRAPHS SIMILAR TO FIGURE 3 BUT INCLUDING AUXILLIARY CHARGES

utilized as such for approximately the same amount of fuel consumed per season. If this room would be included in the living rooms upstairs, it would require at least seventy-five feet of steam radiation. Consequently, the added cost of coal or oil to heat this room for a season would be, estimating conservatively, twenty-four dollars ($24.00).

Now for the least tangible fuel charge: No matter what fuel is used, dirt and dust carried in the house from the outside will be circulated by convection currents and will settle on the walls and furnishings. However, coal dust and finely divided ash will rise through areaways, hallways, partitions, etc., and contribute their share of havoc to painted surfaces and hangings. In the case of oil there is always the so-named "afterfire" which results in smoke and, very often, a thin film of oil manifests itself on furniture, walls and draperies. In view of the above, it is evident that a home heated with coal or oil will have to be renovated oftener than one in which gas fuel is used. But how much? The walls and ceilings of the average home are cleaned every

	FUEL	B.T.U CHARGE	LABOR CHARGE	AUXILLIARY CHARGE	INCREASED SPACE CHARGE	CLEANING CHARGE
5-TON	COAL	81.00	161.00	161.00	185.00	205.00
	OIL	109.02	109.02	144.02	168.02	188.02
	GAS	134.06	134.06	134.06	134.06	134.06
10-TON	COAL	162.00	242.00	242.00	266.00	286.00
	OIL	218.04	218.04	253.04	277.04	297.04
	GAS	261.11	261.11	261.11	261.11	261.11
50-TON	COAL	810.00	890.00	890.00	914.00	934.00
	OIL	1090.20	1090.20	1125.20	1149.20	1169.20
	GAS	1209.97	1209.97	1209.97	1209.97	1209.97

TABLE-5
COMPLETE COST DATA ON COAL, OIL, AND GAS FUELS

year and from personal experience the cost will average $100 a season. If we assume now, and this is a very modest assumption, that in five years, if gas is used as a fuel, only four cleaning bills were paid there would be a saving of $100 in five years, or twenty dollars a year. This twenty dollars must then be charged against coal and oil fuel. In the case of our twelve-apartment building, fifty tons of coal per season, this charge was left the same and not multiplied by twelve because of the improbability of coal dust and ash effects on individual apartments.

From the above discussion it is possible to tabulate cumulative costs data as illustrated in Table 5 and shown graphically in the final form in Figure 4.

4—General Satisfaction in Operation

We will not assign any monetary value to the following features of gas fuel, although they are certainly worthy of consideration. Among these very desirable features may be mentioned: Absolute thermostatic control, continuity of fuel service, uniformity in fuel supply and a willing service to customers.

Notes on a Rotary Displacement Station Meter*

RESULTS OF OBSERVATIONS MADE UNDER A TEST

By Erwin C. Brenner, Milwaukee Gas Light Co.

For a long time gas engineers and plant operators have recognized the possibility of calculating gas volumes pumped by a booster or exhauster from the speed and displacement of these machines, making due allowance for slip. The slip so allowed was either determined by test under average conditions or taken from data on like units operating under similar conditions. While volumes so calculated are not an accurate measurement, they afford comparable data. It was not until recently, however, that machines of this type were developed as gas station meters.

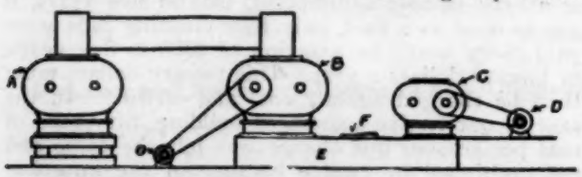
The observations in this paper are those made during the testing and operating of a Connersville Rotary Displacement Meter having a capacity of 20,000,000 cubic feet per day. This meter is located at the Third Ward Works of the Milwaukee Gas Light Company and meters all coke oven gas purchased by the company.

*Paper read at Wisconsin Utilities Association Convention.

Meter Design and Construction

In general design and construction the meter is very similar to that of blowers and exhausters with which we are familiar. Since, however, the meter is not doing work, but is being driven by the pressure of the gas metered, it is possible to considerably increase the displacement of the impellers per revolution. This is accomplished by reducing the thickness of the impellers at the waist. Beside increasing the displacement, two further desirable factors are introduced. First of these is an increased area

of contact between the impellers, and between the impellers and the case. This materially reduces the slip and hence increases the accuracy of the machine. The other is an increase in impeller area acted upon by the inlet gas pressure, hence making it possible to drive the meter at a low differential. To reduce mechanical friction to a minimum and permit a low operating diifferential, the impeller shafts are mounted on ball-bearings packed in grease. At each end of the case are a pair of timing gears operating in oil. Their function is to keep the impellers in the same relative position. The counter is connected with the impeller shafts through a 10 to 1 reduction gearing. To obtain the actual revolutions, the reading of the counter must be multiplied by 10. At the opposite end of the case a handwheel is located to be used in making slip tests.



The inlet connection is at the top of the meter, making the direction of rotation of the impellers downward at the sides of the case. This makes the meter self-cleaning and reduces the possibility of damage from particles carried in suspension in the gas.

Calibration and Testing

The method of calibrating the meter at the manufacturers was as follows:

If one of two like meters operated in series is operated at zero differential, the quantity of gas discharged per revolution is equal to the displacement of the meter per revolution. If this known quantity of gas is then passed through the other meter, the difference in revolutions between the machines will be a measure of the slip in the meter at the particular load under which it was operated.

The general arrangement for such a test is shown in the accompanying sketch:

Booster "C" was driven by a constant speed motor "D". The air delivered by the booster through duct "E" is the chief motive power for driving meter "B". This, however, will cause a differential pressure across "B". To overcome this a variable speed motor "G" was connected to the impeller shaft of "B" and operated at such a speed as to give no differential pressure on "B" for various rates of flow through the meter. The meters are direct connected by 24 feet of 30 inch pipe. Counters reading direct in revolutions are attached to the impeller shafts of both machines. Differential gauges were connected across both meters. The amount of air flowing through the meters was regulated by slide "F" in duct "E".

Calibration at the manufacturers was necessarily confined to the use of the air as the gas medium, and to operating the meter dry. While these conditions are not truly representative of the conditions met in actual service they can be considered a fair test of the accuracy of the meter.

The displacement of the meter per revolution is obtained as follows:

The dimensions of the displaced gas volume per revolution are 84 inches (the width of the impellers) and 4 times the cross-sectional area of the gas space included between an impeller and the meter case. To determine the cross-sectional area of this gas space it is necessary to know the cross sectional area of an impeller. This has been determined mathematically to be 727.628 square inches. Checking the calculated area with a planimeter gave 727.078 square inches. The tip to tip measurement is 47 13/16 inches. Hence the cross sectional area of the displaced gas volume can be defined as twice the difference in area of a circle 47 13/16 inches in diameter and the cross sectional area of the impellers, which becomes 2,136 square inches. Hence the volume displaced becomes

$$\frac{2136 \times 84}{1728} = 103.816 \text{ cu. ft.}$$

Dry Air Slip Tests

A series of slip tests with the arrangement described above were made. Of these the following two are characteristic:

	Rate	
	322M/hr.	517M/hr.
Duration of test, hours	1	1
Revolutions of driven meter (B)	3127	4973
Revolutions of measuring meter (A)	3117	4969
Apparent slip in revolutions	10	4
Pressure at inlet of (B) inches of water	.395	.90
Pressure at inlet of (A) inches of water	.27	.56
Differential pressure of (B) inches of water	0.0	0.0
Differential pressure of (A) inches of water	.11	.18
Temperature of gas, degrees Fahrenheit	65	70
True slip (apparent slip plus volume change corrected to inlet pressure of (A))	1137	1015
Slip in % of volume measured	.35	.20

A check determination was made at the latter rate (517,000 Ft³./hr.) operating meter "B" in such a manner that its differential was the same as that of "A". The apparent slip in one-half hour's operation in this case should be equal to that of one hour in the previous test. In actual test this was found to be 7 revolutions, or 727 Ft³., as against 1015 Ft³.; hence checking the result previously obtained within reasonable limits.

Hand Wheel Slip Tests

This test consists of determining the impeller speed necessary to maintain a given differential across the machine with the inlet and outlet connections closed. The speeds so determined in revolutions per minute can be considered the slip at that differential. Speeds so determined throughout the range of the meter can be plotted and a slip-curve drawn. To correct the gas volume metered under

(Continued on Page 316)

As the Journal Views It

THE VALUE OF PUBLICITY

The value of publicity was never more clearly demonstrated than during the week beginning March 26, when the Consolidated Gas Company of New York held a celebration in commemoration of a hundred years of gas service in New York City. During that week the newspapers of the country, realizing that it was an event of real importance, devoted considerable space to the story of the development of the company from its inception to its present efficient condition.

The result, which is not always easy to check, showed its worth in dollars and cents, for from each of the branch offices of the company and from its main office as well, came reports of unusual demand for gas consuming appliances.

In connection with the celebration, all of the windows of the various showrooms were filled with interesting exhibits, things that had a real human interest appeal. At all hours of the day groups gathered around the windows and spent considerable time looking over the articles on display, and that the desire to possess was aroused to a remarkable degree is shown in the result as described.

Exact figures are not available as this is being written, but from one branch reports were received showing that the week under discussion had been the best in seventeen years.

We don't believe that any comment is necessary, but to us it showed that the policy pursued by the company—that of building good will—is a policy that cannot fail to show results. Of course, these results cannot always be traced so accurately, nor do they appear so quickly in all cases, but the constant hammering away is bound to have a favorable reaction.

There is one point that we want to emphasize, and that is that the exhibits and the reading notices contained more than mere statistics. Rather, they were builded on an appeal that was bound to win the interest of even the most casual passer-by or the man who runs as he reads.

We want to take this opportunity to give full credit to Robert E. Livingston, who so capably originated and carried out the thought that gave impetus to this celebration. It has brought great credit not only to the Consolidated Gas Company of New York, but also to the gas industry as a whole.

CO-OPERATING WITH THE ACCOUNTING DEPARTMENT

How closely do all the departments in your company co-operate with the accounting and auditing department? How frequently is it necessary for a work-order to be sent back to have the actual costs filled in so as to be able to compare them with the estimates that previously had been furnished? These questions are closely connected with the efficient management and operation of a company, for when the work is not done the first time it sometimes is allowed to lapse over a period of time and then there is a lot of time lost looking up records that were available in the first instance.

To many of the men who are connected with the operation of the plant and distribution system the accounting department is regarded as an evil—a necessary one, but nevertheless an evil. Yet this department is the one that in the long run shows whether the manufacturing end or the distributing end is being run efficiently or not. In other words it is the department that is charged with seeing that efficiency is maintained.

Everybody likes to be called before the chief or the board and told that the results obtained during a previous period were extremely satisfactory, and yet the report on which this commendation is based comes entirely from one source: the figures produced by the accounting department.

Of course, all companies do not have the same system of work-orders, but every company has some form of report covering the activities of the company while a system of work-order numbers shows what items are to be charged against each job. But whatever system is in use the result is always the same: the figures that come from the accounting department tell the story of the management of the department involved.

Turn out your figures when they are due and when the work-order, or whatever report you use, is forwarded to the accounting department. Such action is going to help you out in the long run. Of that we are sure.

NOTES ON A ROTARY DISPLACEMENT METER

(Continued from Page 314)

known meter-differential for slip, the R. P. M. corresponding to that differential must be added to the R. P. M. indicated on the counter. This test, however, has its limitations. First, it is not a test of the meter at actual operating speeds of the impellers. Second, it is dependent on such factors as: (a) the character of the internal surfaces, whether wet or dry; (b) the density of the gas used in making such a test; (c) the temperature of the meter case and impellers. The value of this test, however, lies in the fact that it provides a simple test to detect any possible wear and hence any increases in slippage.

Performance in Service

The meter at the writing of this paper has been in service for thirty days, and been operated at an average load of 625,000 ft³./hr. or 15,000,000 ft³./day. The differential at this load with the internal surfaces of the meter moist with condensation averages .3 to .5 inches of water column. The greatest differential observed has been .7 inch of water column at a load of 728,000 ft³./hr. Though this meter has been operated through a temperature range of 54 to 84 degrees Fahrenheit no trouble has been experienced from sticking or a building up of differential pressure. Some comparison as to the accuracy of the meter in service has been afforded by the fact that the gas has also been metered by a Thomas Meter and a Pitot Tube. A comparison of these registrations for 21 days is shown below:

Rotary displacement meter, total for 21 days ..... 322,485,000 ft³.
Thomas meter, total for 21 days.... 321,817,000 ft³.
Pitot tube, total for 21 days..... 325,825,000 ft³.

Difference between rotary displacement and Thomas meter is 668,000 ft³. or .207% of gas metered.

Difference between rotary displacement and Pitot tube is 3,340,000 ft³. or 1.02% of gas metered.

DUNBAR RESIGNS FROM CITIZENS GAS CO.

According to information from his home at New Albany, Ind., Congressman James W. Dunbar, elected some months ago as vice-president and director of the Citizens Gas Co., of Indianapolis, Ind., because of ill-health, has tendered his resignation from the company's official staff. The present condition of Mr. Dunbar's health was given in newspaper dispatches from his home city as the reason for his withdrawal from connection with the company. Mr. Dunbar's intended direction of the company was given wide publicity almost a year ago, but he has since that time been able to give little attention to the new duties. When he was elected to the position with the big Indiana gas company, he expected to devote all his time to the interest of the company immediately after the adjournment of the Congress last summer.

When the President, however, called the special session of Congress, Mr. Dunbar, who represented the Third Indiana District, felt obligated to go back to Washington, and when he returned to Indianapolis in the autumn months, an operation of a serious character was undergone in an Indianapolis hospital. He remained in the hospital until the end of December. On recovering from the operation his strength returned but slowly, and his physicians advised him to return to Washington for the remaining short session of the Congress rather than to undertake the arduous duties with the gas company.

Forrest Announced Retirement in January

Early last January J. D. Forrest announced to the Indianapolis public that he would retire from his position of general manager of the gas company on July 1, 1923. It was believed by some that Mr. Forrest would change his intention to withdraw from the gas company management on July 1, when the announcement of Mr. Dunbar's retirement from his new position was made, but in an interview just given to the public Mr. Forrest reiterated his intention of severing all executive responsibility with the company July 1.

"The resignation of Mr. Dunbar is a matter of great regret to me," said Mr. Forrest, "as I have the highest regard for him and had entertained hopes that he would be a most useful man as chief executive of the gas company. But this can make no difference in my own plan to retire from all executive responsibility with the company on the first of July. No action on the part of the directors and voting trustees could induce me to alter the decision which I announced at the annual meeting in January.

Has Given Fifteen Years of Life

"I have put fifteen of the best years of my life into the work of this company at a very great sacrifice of other important interests. I feel that I have done my bit. We have won a great victory in the recent rate case in the Federal Court, and the business of the company is now in a satisfactory state. There will never be a better time for me to draw out; and I could not be induced to remain after July 1 except on conditions which I could not expect the directors and trustees to meet.

Will Always Be Interested in Company

"However, my interest in the future of the company must continue to be very strong, and I shall be glad to be helpful in any possible manner. But my connection with the company as its chief executive will be absolutely terminated on the date named. It is not yet known what will be done in the matter of reorganization or in the selection of my successor. A committee of the board of directors was appointed to make recommendations on these subjects, but it has not yet reported, and I understand it is not quite ready to report."

The Use of Coke Breeze in Conjunction with Illuminating Gas

By Dr. Wilde in Das Gas und Wasserfach, 1922, 809-811

In the year 1917, due to the scarcity of coal, the electric light works of the city of Kiel in Germany was forced to burn coke breeze in the boiler plant. A plentiful supply of the breeze was available from the gas works, connected with the power plant. The coke breeze was burned on traveling grates and it was found possible to use at a maximum 30 per cent of coke breeze in the fuel without any impairment of the operations. When a higher percentage was used, it was found that the operation of the boilers became uncertain, due to the cooling of the fires. It may be possible to use a higher proportion of coke breeze in the fuel, but only in case the former contains an appreciable amount of volatile constituents, so as to be able to burn up the fine slack carbon on the traveling grate.

While it was not possible to burn any more coke breeze in conjunction with the coal fuel at the Kiel plant, due to the fact that practically all of the volatile constituents of the coal were recovered in the chamber oven installation in the plant, nevertheless, the results obtained were so favorable that when a new installation was erected during the past year, it was placed close to the by-product coke oven plant, so that it would not be necessary to move the breeze a great distance before it reached the boiler plant where it could be burned in conjunction with the regular coal fuel.

The furnaces were constructed in special form so as to make it possible to burn low calorific value fuels with the maximum efficiency. Forced draft was used to accelerate the combustion and the heating surface of the boilers was made so large with respect to the grate surface that in spite of the fact that poor quality fuel was used, a normal production of 40 kilograms of steam per square meter of heating surface was obtained. The width of the grate was made about 1.5 meters, so that, although the temperature of combustion is high, which must be expected in the combustion of coke with the aid of forced draft, the crown of the furnace nevertheless has as long a life as possible. The cooling chambers or checks, which are arranged on either side of the furnace, and which have a length of four meters, served for the same purpose. These chambers were built directly into the furnace setting. The grate was of the so-called forced draft traveling grate and possessed a length of 5,315 meters, so that the coke had sufficient time in which to be burned up completely. Of the four air-chambers, the last, which lies in the combustion zone, is almost completely shut off during the operation of the furnace, and the expected result, namely, that the fuel was burned under the best conditions possible, was actually attained in practical operation. Only a small amount of combustible matter was found in the clinker.

In traveling grates there is provided a sort of scraper, either stationary or movable, swing back and forth, which spreads the fuel over the grate. As the mixture of coal and coke gives rather tough clinker lumps, which vary greatly in size, it is necessary to set the scraper at such a distance above the grate so that the clinker passes under it easily. In this manner the scraper holds back just the unburned pieces of coke. The grates themselves are made accessible at the back as well as from the front, which is very advantageous in the operation. Under normal operation the amount of combustible matter in the ash and clinker was not too high, but when the plant was operated at top speed this loss naturally increased to a considerable extent.

The proper mixing of the coke breeze and coal was attained by dividing the fuel bunker, which had a capacity of 1,800 tons, into two parts by a longitudinal wall. In one half coal was stored and in the other half coke breeze. This arrangement is seen in the accompanying diagram. Under the loading funnels there are two circular discs, which are kept in continuous rotation. The coke and coal drops on these discs and definite quantities of each are pushed off by the adjustable slides. In this manner the proper amounts of coal and coke can be measured out and mixed together on the automatic weighing device. This apparatus worked very effectively.

In spite of the good mixing, which was attained by the use of the apparatus described above, it was found necessary to use at least 40 per cent of coal in the mixture, in order to secure proper combustion. The coke breeze was sifted, so that all pieces smaller than 15 millimeters in diameter were removed.

The Addition of Gas in the Combustion Process

It was natural for the idea of using illuminating gas in conjunction with the coke breeze to have suggested itself due to the proximity of the gas works to the power plant. After considerable discussion it was decided to burn the gas in the furnace, but without first mixing it with air. It was thought that the air, required for the combustion of the gas, could be supplied by the excess of air that is already present in the fire-box. Actual tests proved the correctness of this assumption, for after the gas burners were installed, the carbon dioxide content immediately increased on the average to 16 per cent. After a gas meter had been installed on the gas line, however, it was found that this high carbon dioxide content was due to the addition of too much gas. It was found that the maximum quantity of gas that could be burned under the furnaces was 400 cubic meters per boiler per hour, under a pressure of 50 millimeters. Under these conditions the carbon dioxide content was reduced to 14 per cent on the average.

There were four gas burners for each furnace, which were built into the crown of the furnace.

The gas burns as it streams out of the pipe nozzles and forms a veil of flame around the crown of the furnace, keeping it hot so that better combustion of the fuel on the grate is obtained. For a time the operation was conducted with a mixed fuel, consisting of 20 per cent coal dust of 5,600 calories and 22 per cent ash, 75 per cent of coke breeze of 4,200 calories and 25 per cent ash, and 5 per cent of illuminating gas. One cubic meter of the gas is equivalent to one kilogram of fuel at 4,200 calories. Half of the coke breeze used did not contain any volatile matter at all, while the other half contained 5 to 6 per cent volatile constituents. The average load on the boilers was 38 kilograms per square millimeter. The average consumption of combustible was about 1.62 kilograms per kilowatt-hour or about 7,400 heat units in round numbers, in spite of the unfavorable load conditions under which the boilers operated. The gas works had a yearly capacity of 30 million cubic meters of gas. It is therefore evident that there was not enough coke breeze made by the gas plant to supply the large operations of the power plant. Coke was purchased for this purpose and it was found that the operation of the power plant under these conditions was every bit as good as in those power plants which burned nut coal solely.

Description of Practical Boiler Plant Test

A practical boiler plant test was carried out in a power plant at Altona to fix the different factors of operation when burning a mixture of coal and coke with the addition of illuminating gas. An inclined tubular boiler which was fired on a traveling grate with air blast was tested out with a mixture of three parts of coke breeze and one part of fine coal. Illuminating gas was burned in conjunction with the above, the gas being introduced through nozzles arranged in the combustion chamber of the furnace. The average calorific value of the mixed fuel was found by determining the calories in the coke breeze and coal dust and calculating the same back to a unit of weight of the mixed fuel. The heat value of the illuminating gas was determined as well and this was calculated back to a corresponding weight of coal of the calorific value of the mixed combustible, so as to arrive at the total load on the grate. The weight and the average condition of the ash and the coke in the flue gas were determined in both of the experiments that were made with this installation.

The following measurements were made at the boilers during the progress of the test. Readings were made at intervals of fifteen minutes each. The various factors were as follows: Temperature of the feed water at its entrance to the flue-gas preheater; temperature of the feed water as it leaves the pre-heater; the quantity of water that flows through just before leaving the water meter; the pressure within the boiler; the temperature of the superheated steam; the temperature of the air used in the combustion; the composition of the flue gases at the left of the boiler, at the right of the boiler and in back of the flue-gas water heater; the temperature of the flue gases at the same points; the draft pressure at the same points; the pressure of the air used for combustion under the grate in the first and in the second zone, and likewise separately for the left fire and the right fire; the quantity of gas fed to the furnace, measured at a gas meter, The steam pressure was not maintained at the highest permissible pressure of 18 atmospheres, but at about 15 atmospheres.

The boiler tests took eight hours in each case. The preliminary test served in fact for the purpose of establishing whether the proper continuous operation conditions of the boiler had been reached

Tabulation of Results Obtained in the Tests

Heating surface of the boiler	sq. meters		407.65
Heating surface of the superheater	sq. meters		102
Heating surface of the flue gas preheater	sq. meters		340
Grate area of the boiler	sq. meters		15.95
Ratio of grate area to heating surface			1: 25.56
Duration of the test	minutes	490	482

Fuel

Coke breeze and fine coal, in a 3 to 1 mixture with the addition of illuminating gas, total consumption:

Coke breeze of 4,035 or 3,988 heat units	kg.	20,100	18,284
Fine coal of 5,782 or 5,916 heat units	kg.	5,430	4,876
Gas of 3,623 or 3,555 heat units	cu. meters	2,161	1,541
Gas, calculated to fuel of 4,407 or 4,394 heat units per kilogram	kg.	1,777	1,247
Total fuel burned on the basis of a combustible of 4,407 or 4,394 heat units per kilogram	kg.	27,307	24,407
Consumption of fuel per hour	kg.	3,344	3,038
Consumption per square meter grate area	kg.	209.6	190.5

Lost Fuel

Ash and clinker: moist	kg.	7,167	6,213
Same calculated on the dry basis	kg.	6,638	5,538
Percentages of burned fuel	%	23.94	22.69
Combustible matter in ash and clinker	%	9.80	12.90
Coke dust: moist weight	kg.	502	385
Same calculated on the dry basis	kg.	327	282
Percentage of burned fuel	%	1.19	1.15
Combustible matter in coke dust	%	71.26	71.70

Feed Water

Total evaporation	kg.	123,777	114,623
Evaporation in one hour	kg.	15,156	14,268
Evaporation per hour per sq. meter heating surface	kg.	37.18	35.0
Temperature of water before entering flue gas preheater	C	37.4	38.7
Temperature of water after leaving flue gas preheater	C	129.42	124.8
Steam (superheated)	atmos.	14.6	14.84
Temperature of saturated steam	C	199.06	199.8
Temperature of superheated steam	C	347.3	339.7
Superheat	C	148.2	139.9
Heat content in one kilogram of saturated steam	calories	670.92	671.09
Heat produced by one kilogram of saturated steam	calories	541.5	546.29
Specific heat of the superheated steam		0.542	0.546
Heat produced in the superheating	cal.	80.42	76.4
Heat of production of one kilogram of superheated steam	cal.	621.92	622.69
Heat content of the same	cal.	751.34	747.49

Gas used for Heating

		right fire	left fire	right fire	left fire
Carbon dioxide at the back of the boiler	%	13.55	12.22	13.79	13.2
Carbon monoxide at the back of the boiler	%	.....	.....	.....	....
Oxygen at the back of the boiler	%	6.15	6.39	5.85	6.23
Temperature at the back of the boiler	C	349.4	366.8	339.15	359.7
Forced draft, in mm. water		15.4	12.3	13.12	9.0
Air pressure under heating zone I, in mm. water		35.6	38.9	33.6	32.0
Air pressure under heating zone II, in mm. water		44.7	44.5	43.9	41.6
Excess air	%	42.8	54.2	35.3	42.2
Carbon dioxide behind the flue gas heater	%		11.7		11.7
Carbon monoxide behind the flue gas heater	%		....		....
Oxygen behind the flue gas heater	%		7.81		7.5
Temperature behind the flue gas heater	C		226		218
Forced draft, in mm. water			23.7		41.3
Air excess	%		59.2		55.5
Temperature of air used in combustion	C		6.3		9.33

Evaporation

One kilogram of fuel evaporates kg. of water		4.53	4.69
Or calculated on steam of 639 heat units	kg.	4.41	4.57

Distribution of Heat

Heat which was utilized in—	cal.	%	cal.	%
1. Production of steam	2,453	55.66	2,562	58.3
2. Superheating	364	8.26	358	8.15
3. Preheating	417	9.46	404	9.20
Total	3,234	73.38	3,324	75.65

Heat losses—				
1. Sensible heat in flue gases.....	538	12.2	510	11.6
2. Combustible matter in ash and clinker.....	190	4.31	237	5.4
3. Combustible matter in coke dust.....	69	1.56	67	1.52
4. Unburned gas, soot, conduction and radiation losses	376	8.77	256	5.83
Heating value of the combustible.....	4,407	100.00	4,394	100.00

and also for the purpose of determining the correct proportions of the mixture of combustibles, the proper amount of gas to add, as well as the correct amount of air to use in the combustion. The principal test was to determine the efficiency of the boiler and to establish the operating conditions. The results of the tests are given in the following table.

In regard to the distribution of the heat in the fuel, the following facts are to be considered. A chemical analysis of the illuminating gas, burned in the furnace, is not necessary, for it is not possible to determine the exact amount of heat lost. One of the known formulae for calculating the heat value of a fuel is used. No great error can be introduced into the test in this manner, for the illuminating gas serves as a substitute for the lack of combustible gas in the coke breeze.

The total efficiency of the operation under these conditions, namely, 75 per cent, as determined in the test, was quite good. The losses did not transcend allowable limits. The combustion of the fuel was very thorough, as was indicated by the small amount of combustible matter in the ash and clinker. The loss due to coke dust being carried along into the flue gases was also small.

GAS BURNER FOR INCUBATORS

Gas is used to good advantage in heating incubators, as it affords a very accurate means of controlling the temperature within this apparatus. In British Patent No. 182,600 there is described a type of gas burner suitable for this purpose. The burner is portable and the base piece on which the burner is mounted carrying a mirror to enable observation of the condition of the flame.

OSCILLATING BELL GAS METERS

This type of gas meter is made in France. In it there are two alternately oscillating liquid seal bells, which are suspended to rocking levers interconnected with one another and with the gas distributing mechanism, so that a rotary motion is imparted to the principal axis of the recording and distributing mechanism by means of suitable connecting rods actuated by the oscillating bells. A distributing slide valve mechanism is used. The moving parts, except the bells and the supporting levers, are protected from contact with the gas and the vapors of the liquid by means of a flexible membrane clamped between the parts of a ball and socket joint adapted to press constantly the slide valve against the distribution plate, by means of which the motion of the rocking lever is communicated to the sliding valves. British Patent No. 182,562.

CONSTANT HEAT VALUE IN GAS

The Gas Research Company has patented an apparatus for maintaining constant heat value in a gas (see United States Patent No. 1,417,635). A portion of the gas, which is to be maintained at a constant calorific value by dilution, is burnt, after dilution, at a constant rate, and the heat produced is utilized to regulate an electrical device. This in turn regulates the valve which controls the flow of gas under pressure. This valve is connected with the one which operates the supply line, feeding air to the gas. Both valves are controlled in this manner.

AMMONIUM CHLORIDE FROM COAL

Ammonium chloride is recovered from coal or shale by impregnating the raw materials with an alkali chloride, silica and water. Free hydrochloric acid is added as well. The proportions may be 3.2 parts of 30 per cent. hydrochloric acid, 2.5 parts of silica, and 4 parts of common salt to 100 parts of the coal. The acid combines with ammonia liberated at temperatures below the decomposition temperature of the salt. See British Patent No. 169,984.

Public Utilities Securities Market Report

Prices of Representative Gas Bonds

(Quotations furnished by The National City Company)

Company.		Maturity	April 12, 1923. Bid	Asked
American Lt. & Trac. Co.	Five Year 6s	May 1, 1925	108	109
Brooklyn Union Gas Co.	First Consol. 5s	May 1, 1945	96	97
Columbia Gas & Elec. Co.	First 5s	May 1, 1927	95¼	96
Consol. Gas, Elec. Lt. & Pr. Co. of Baltimore	First Ref. 7½s	Dec. 1, 1945	110	111
Consol. Gas, Elec. Lt. & Pr. Co.	General 4½s	Jan. 1, 1935	90	91¾
New Amsterdam Gas Co.	First Consol. 5s	May 1, 1948	80	81½
Denver Gas & Elec. Co.	Gen. (now 1st) 5s	Jan. 1, 1949	93	94½
Detroit City Gas Co.	Gold 6s	Jan. 1, 1947	99¾	100¼
Equitable Illum. Gas Lt. Co. of Philadelphia	First 5s	Jan. 1, 1928	99½	101
Hudson County Gas Co.	First 5s	Nov. 1, 1949	93¼	—
Laclede Gas Light Co.	Ref. & Ext. 5s	Nov. 1, 1934	93¾	95
Michigan Light Co.	First & Ref. 5s	Mar. 1, 1946	90	91½
Milwaukee Gas Light Co.	First 4s	May 1, 1927	93½	94½
Pacific Gas & Elec. Co.	Gen. & Ref. 5s	Jan. 1, 1942	89¼	89¾
Pacific Gas & Elec. Co.	First & Ref. 7s	Dec. 1, 1940	105½	107
Cal. Gas & Elec. Corp.	Unif. & Ref. 5s	Nov. 1, 1937	94¼	95¼
Peoples' Gas Lt. & Coke Co.	Refunding 5s	Sep. 1, 1947	87½	89
Chicago Gas Lt. & Coke Co.	First 5s	July 1, 1937	89	94
Portland Gas & Coke Co.	First & Ref. 5s	Jan. 1, 1940	88	91
Seattle Lighting Co.	Refunding 5s	Oct. 1, 1949	80	83
Southern California Gas Co.	First 6s	Nov. 1, 1950	97	98½
Utica Gas & Electric Co.	Ref. & Ext. 5s	July 1, 1957	88	91½
Washington Gas Light Co.	General 5s	Nov. 1, 1960	94	95¼
Western States Gas & Elec. Co. of California	First & Ref. 5s	June 1, 1941	90	92

Boone Co. Gets 25-Year Franchise

Boone, Iowa.—The 25-year franchise, granting to the Boone Gas Company certain rights and privileges, carried by a majority of 462 votes.

Under the statutes of Iowa, a franchise granted to a utility by the City Council must be approved by a majority of the voters voting.

This is the third election held for this purpose, the first in March, 1922, at which the franchise was beaten about five to one; the second, held in November, 1922, resulted in a defeat by only 125 votes; and this recent election of March 26th, with the result as mentioned.

E. G. Pratt is president; Geo. D. Roper, vice president; E. C. Brown, secretary and treasurer, and H. G. Stillson, manager, of the company.

Kearney to Enlarge Gas Plant

Kearney, Neb. — The Central Power Company announces plans for rebuilding of the local artificial gas plant, providing for the installation of new machinery at a cost in excess of $40,000. A new large generating plant to be installed will have double the capacity of the present plant. Coal gas will be manufactured.

Gas Output of Schenectady Plant During March Most in Its History

Gas output of the local plant of the Adirondack Power and Light Corporation during March was the largest in the history of the concern, amounting to 70,000,000 cubic feet, officials announced. This furnished a sharp contrast with the figure for the same month last year, when the output was only 47,000,00 cubic feet.

A proportionate rise in gas heaters sold during the sale recently closed was also noted, as compared with sales in previous years. Water heaters sold last month, during the annual sale, totalled 236, while gas ranges sold numbered 214. For the same sale in March of 1922, 131 ranges were sold and 201 heaters.

Phila. Suburban Co. Installing New Water Gas Plant

The Philadelphia Suburban Gas & Electric Company of Philadelphia, Pa., has decided to install a complete new water gas plant at Oreland, Pa., which is just outside of Philadelphia.

The plant will be laid out for about 4,000,000 cubic feet of water gas per 24 hours, and about 4,000,000 cubic feet of coal gas per 24 hours.

The contract for the first unit of the water gas equipment, consisting of a 9 foot double superheater carburetted water gas apparatus, has been placed with the Gas Machinery Company of Cleveland, Ohio.

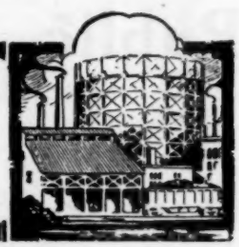
The contract includes overhead operating floor, blowers, oil pumps, steam and air meters, explosion check valve, waste heat boiler for blast gases, automatic control, exhausters, P. & A. far extractor and auxiliary equipment.

The plant will also include generator and boiler fuel handling equipment, new boiler plant and auxiliaries, purifiers, meter, tar and liquor separator, pumps and piping, yard piping, etc., and will enable the gas company to continue to serve the fast growing district that surrounds Philadelphia in proper manner.

Edward Tuite Promoted

Blackstone, Mass.—Edward Tuite, Blackstone Street, who has been employed by the Woonsocket division of the Blackstone Valley Gas & Electric Company, has been promoted to sales manager of that division.

NEWS OF THE GAS INDUSTRY



Eight Hundred Attend Eastern States Conference

Philadelphia, Pa. — With the largest attendance of any gas meeting, with the exception of the annual gathering of the American Gas Association, the Eastern States Gas Conference held its first annual gathering in this city, April 11, 12 and 13, at the Bellevue-Stratford Hotel. There were about 800 gasmen present when President Philip H. Gadsden called the initial session to order: It was the consensus of opinion of those present that with the exception of the national gathering the greatest amount of work was accomplished of any gathering.

Subjects of vital importance to the industry, house heating, house piping, water heating by gas fuel, meters and gas lighting were discussed from every angle and it was notable that those who took part in the discussion were optimistic in their views of the future.

An interesting feature that was not on the formal programme issued by the Conference was a tour of inspection of the Twenty-fifth Ward plant of the Philadelphia Gas Works which was arranged by the U. G. I. Contracting Co., and was carried out under the direction of L. L. Moore. This took place on Friday and a large number of gas men were in the large motor buses which carried the party to the plant where the new installation of vertical retorts was carefully examined. A luncheon was served and it was agreed that the visit was one of the bright spots of the convention.

The officers of the Eastern States Gas Conference who had only been elected three months prior to the gathering were unanimously re-elected. These officers are: P. H. Gadsden, president; P. S. Young, first vice-president; H. S. Schutt, second vice-president; W. R. Rhoades, third vice-president, and secretary-treasurer, L. R. Dutton.

The membership of the Eastern States Gas Conference includes gas companies in Pennsylvania, New Jersey, Delaware, Maryland, West Virginia and District of Columbia.

The keynote of the conference was sounded by Mr. Gadsden in his opening address when he declared that employees of gas companies should be taught the business and good will of the public should be kept by service and by constant advertising in the public press. Mr. Gadsden's address in full will be published in another issue of the "American Gas Journal." His address indicated, however, that the trend of the policies of the gas industry in the future will be to bring about a closer and more cordial relationship with the public and the consumers in general.

The first day's session of the gathering was devoted to papers and discussions on House Heating with Gas Fuel and House Piping. The papers which were presented on these subjects will also be found in future issues of the "American Gas Journal." N. T. Sellman, assistant secretary-manager of the American Gas Association attacked the problem of house heating with gas from a new angle that was found to be extremely interesting by his hearers. His analysis of the problem and his recommendations were novel and provoked a large amount of informal discussion following the regular sessions. His paper was one of the principal features of the Conference.

John Graham, Jr., an architect of Philadelphia, discussed house piping from the viewpoint of an architect, while D. F. Durkin, Jr., Past President National Association of Master Plumbers, Philadelphia talked on this subject from the angle "Will the Plumber Sell House Piping for Gas and How the Gas Company Can Assist Him." L. N. Yetter, New Business Manager of the Atlantic City Gas Company, took a leading part in the discussion.

"Water Heating by Gas Fuel" was the first subject considered at the second day's session with a speech presented by H. J. Long, New Brunswick, N. J. B. H. Atwood, whose paper will be published in these columns shortly, took up the question of how to sell automatic hot water service while George B. Baines told how to install this service. R. A. Koehler, gave information on the way in which to keep records and Jacob B. Jones dealt with the question: "Why Should Consumers Purchase Automatic Hot Water Service" from a humorous and human interest standpoint but in a manner that drove home his points.

A feature that attracted considerabble attention was the subject of Employees and Public Relations in which Mr. Gadsden took a leading part. Others to discuss this subject included C. N. Lauer, J. B. Jones, S. J. Franklin, vice-president Cumberland County Gas Company, Millville, N. J.; H. H. Ganser, Norristown, and W. R. Rhoades.

Gas Ranges, including a discussion of the American Gas Association specifications were discussed by William T. Rasch, J. D. Taylor and Stanley Grady.

Thursday evening came the big social feature of the gathering—the banquet. President Gadsden was toastmaster and the speakers included General Amos A. Fries, Dr. J. Duncan Spaeth and B. J. Mullaney.

The final session of the convention on Friday brought out two subjects, transportation problems, discussed by Robert S. Binkerd, Committee on Public Relations Eastern Railways, and "Shall We Go Back to Local Regulation of Utilities," by H. C. Spurr.

$10,000,000 Bond Issue Is Announced by Philadelphia Company

A plan for a general expansion of public utilities in Pittsburgh was recently announced by the Philadelphia Company in connection with an offering of a new issue of $10,000,000 Philadelphia Company 15-year 5½ per cent convertible debenture gold bonds, dated March 1 1923, and due March 1, 1938.

The expnasion will bring into immediate storage for public utility purposes an immense tonnage of coal, with river and railroad facilities to maintain the reserves behind this storage. The plan will give Pittsburgh an increased volume of natural gas flowing from feeding subsidiaries. It will provide reserve pressure and enlarged volume of gas in a new holder of large capacity at El Ramo, and flow from wells to be drilled in a new campaign of operations in the gas belts which supply Pittsburgh.

It will furnish a huge supply of live steam, carried in concrete tunnels and insulated pipe systems in the downtown business district from Ross and Grant Streets to the Point. This underground steam line and its branches will furnish heating for office buildings and institutions in the area covered. The steam will be generated in a proposed new plant to be located in the Phipps Building in Duquesne Way and vacant ground adjoining which the Philadelphia subsidiary, the Allegheny County Steam Heating Company, recently purchased.

The improvements include expansion in the way of purchase and operation of additional coal mines to insure unbroken public utility service under every emergency. In the combination of railroad and river shipments the plan contemplates the use of a fleet of ten large steel barges now under construction, automatic elevators and automatic stokers.

It is expected that with great numbers of large buildings drawing their steam heat from the underground tunnel and conduit systems deliveries of coal by trucks in the congested district of the city will be eliminated, helping thereby to clear the triangle streets of a heavy traffic, especially in winter months.

A new manufactured gas plant will be located at El Ramo, on the Monongahela River, beside or near the present plant. To give equality to pressure in distribution a large holder, with many million cubic feet capacity, will be located at this plant. The details of this plant are now under the study and designing survey of expert engineers.

To enlarge natural gas supply for Pittsburgh, the Philadelphia Company will erect at least one new pumping station on the line delivering the flow from the wells to this district. New wells will be drilled, to be turned into this main. Officials of the company have said that consumers of natural gas had been in some measure saved by three mild winters in succession. The enlargements in natural gas supply are designed to protect consumers in case of a winter with prolonged cold days and nights.

Proposals for expansion in downtown steam heating supply are considered most unusual and ambitious. The Allegheny County Steam Heating Company is completing the construction of a solid concrete tunnel, nine feet high, extending underground from Ross Street to Duquesne Way. Branches of this main tunnel will be of concrete also, with wooden pipes, insulated with tin and cork. These tunnels and conduits will carry the steam pressure pipes.

The central steam generating plant will be in the Phipps Power Building on Duquesne Way, owned by the heating company. On vacant ground adjoining, recently purchased, a big addition to the power building will be erected. The equipment for supplying steam for the tunnel and conduit lines will include unusual features in engineering designs. One of the boilers will be of 2,500 horsepower. Engineers are working out the details of patterns for this record-breaking boiler. Two other boilers, each with a capacity of 1,500 horsepower, will be installed.

These boilers will have self-feeding stokers. An elevator and street-bridging system will carry coal direct from freight cars on the Pennsylvania Railroad siding along Duquesne Way to the stokers, automatically dump it and return the empties. A fleet of ten steel barges will be fitted with elevators to raise the coal from the barges and carry it automatically to the stokers. Since the coal has to be fed by gravity elevation over Duquesne Way, the new building which will house the huge boilers will be equivalent in height to an eight-story office structure.

The barges will have a capacity of 1,000 to 1,500 tons each, a maximum capacity equal to thirty railroad cars. These barges are now being constructed by the Dravo Construction Company.

The power house itself will have storage bins for a coal supply of two days at maximum consumption. The capacity of additional bins at the river bank will be 20,000 tons. The company now has coal storage space in a sunken concrete reservoir on Brunot's Island for 110,000 tons. This will be enlarged.

The company now operates a large coal mine at the Colfax plant, where coal is automatically delivered from the mine mouth to the stokers, which in turn automatically cast the ashes into freight cars. Negotiations are under way to add to the company's coal holdings other tracts. The barges will carry the product of the mines to Duquesne Way, while railroad transportation also is provided for.

Lukens Leases Gas Co.

Amsterdam, N. Y.—After five years of success as commercial manager of the Chuctanunda Gas Light Company of this city, C. Purnell Lukens has resigned that position to become state salesman for the Hoffman Heater Company, manufacturers of instantaneous gas heating appliances at 32 East Thirty-third Street, New York.

Fifteen years ago Mr. Lukens entered the gas appliance and development business with the Jenkintown & Cheltenham Gas Company at Wyncote, Pa. He held several responsible positions in that line before coming to this city. During his residence in this city, he was a member of the Board of Trade and the Kiwanis Club. He was ever interested in the affairs of the city. According to his present plans, he will continue to make his home in this city.

P. K. Reed Appointed

P. K. Reed has been appointed manager of the Chicago office of R. H. Beaumont Co., Philadelphia. Mr. Reed's headquarters will be in the Monadnock Block.

Plans Completed for Southern Association Convention

"It's going to be a great convention!"

These few words sum up a prediction by F. L. Marshall, of Augusta, Ga., chairman of the paper committee, to Philip H. Gadsden, of Philadelphia, president, regarding the convention of the Southern Gas Association, to be held in St. Petersburg, Fla., April 16, 17 and 18.

Members of the paper, program and entertainment committees have completed their advance work for the convention. These committees have planned three days of real work for the industry, with an attractive offering of sight-seeing trips and a banquet. The Hotel Huntington will be headquarters.

Among the papers to be read are the following:

"The Economic Problem of Our Industry," by A. B. Skelding, manager Charlotte Division of the Southern Public Utilities Company.

"The Handling of the Winter Heating Load and Its Equalization in Summer by the Sale of Gas for Water Heating," by Stuart Cooper, vice-president and general manager, Charleston Consolidated Railway and Lighting Company.

"How to Prepare and Present a Rate Case Before Public Service Commissions," by S. E. Linton, vice-president and general manager, Nashville Gas and Heating Company.

"Efficiency of Boilers (Including Tar Burners)", by Alan D. Whittaker, superintendent gas works, Georgia Railway & Power Company.

The program in detail follows:

Monday, April 16—A. M.: Opening business session, address of welcome by the Mayor of St. Petersburg; invocation. 2 to 6:30 P. M.: Automobile sight-seeing trip through the city, followed by automobile trip to Pass-a-grille Beach, with bathing, dancing, music and fish fry. Night: Business session.

Tuesday, April 17—A. M.: Business session. 2:30 to 6 P. M.: Street car ride to Pasadena Country Club; various races and other entertainment. Night, 7:30 P. M.: Banquet, with orchestra and vaudeville, followed by ball.

Wednesday, April 18—A. M.: Business session. P. M.: Boat excursion to Tampa, with sight-seeing trip in Tampa; supper served on the boat on return trip.

Letters received by G. H. Smith, Norfolk, Va., secretary of the association, give promise of the largest attendance in the history of the organization. St. Petersburg, one of Florida's most attractive cities, has made preparations to entertain the visitors. Members of the Chamber of Commerce will take a leading part in the three days' festivities.

McKinney Gas Mains Will Be Extended

McKinney, Tex.—The Municipal Gas Company is preparing to extend a gas main to the cotton mill section of McKinney. The new extension will cost from $17,000 to $20,000. Mike Murphy, engineer employed by the company, from Dallas, will supervise the work.

Adds Water Gas Apparatus

The Pittsfield Coal Gas Company has lately awarded contract to the U. G. I. Contracting Company of Philadelphia for the installation of additional carburetted water gas apparatus. The apparatus will be equipped with the U. G. I. automatic control.

The contract also calls for the installation of complete blowing plant in duplicate, together with a blast main system which will connect with all of the water gas apparatus in the generator house. Also additional high duty condensing system and take-off mains. Over 2,000,000 cubic feet daily manufacturing capacity will be added to the plant by the addition of this equipment.

Clare N. Stannard on Co-operation

Clare N. Stannard, general manager of the Denver Gas and Electric Light Company, addressed the Denver Optimists, concerning the movement for a Greater Colorado. Mr. Stannard said:

"Co-operation is the fundamental principle upon which the movement is built. This will tend to eliminate the petty jealousy that has existed between outlying towns and cities in the state, for these towns are represented by officers in the movement, and the organization will work for the good of all Colorado."

Perhaps your own state is meeting with discordant factions! Is there the spirit of Co-operation? How about your employees? Think this over.

Grand Rapids Co. Orders Pressure Regulator

The Grand Rapids Gas Light Company of Grand Rapids, Michigan, has placed order with the Gas Machinery Company of Cleveland for a 12 inch and also for a 16 inch motor driven pressure regulator to regulate and maintain a practically constant pressure in the retorts of their two stacks of 22 feet through eights.

By the use of power driven pressure regulators a uniform pressure condition will be obtained in the retorts, resulting in a maximum yield and uniform quality of gas.

Standpipe troubles are also minimized and carbon formation greatly reduced.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF AMERICAN GAS JOURNAL.

Published weekly at New York, N. Y., for April 1, 1923.

State of New York, County of New York, ss.: Before me, a notary public in and for the State and county aforesaid, personally appeared Stanton G. Krake, who, having been duly sworn according to law, deposes and says that he is the vice-president and treasurer of the American Gas Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—American Gas Light Journal, Inc., 53 Park Place, New York, N. Y. Editor—Walter A. Fairservis, 933 President Street, Brooklyn, N. Y. Managing Editor—None. Business Manager—Stanton G. Krake, 319 Washington Avenue, Brooklyn, N. Y.

2. That the owners are: American Gas Light Journal, Inc., 53 Park Place, New York, N. Y.; Stanton G. Krake, 319 Washington Avenue, Brooklyn, N. Y.; Elbert P. Callender, Princeton N. J.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and security in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

Stanton G. Krake,
Vice-Pres. & Treasurer.

Sworn to and subscribed before me this 6th day of April, 1923.

[Seal] Bessie S. Seibold.

(My commission expires March 30, 1925.)